

7MHz CW/AM QRP TRANSMITTER

D. PRABAHARAN

The circuit of a 7MHz CW / AM QRP transmitter described here can be used to transmit either CW or audio frequency modulated signal over a 7MHz carrier.

The carrier frequency oscillator is crystal controlled using 7MHz crystal in its fundamental mode. The tank circuit comprises a shortwave oscillator coil which can be tuned to 7MHz frequency with the help of $\frac{1}{2}$ J gang capacitor VC1.

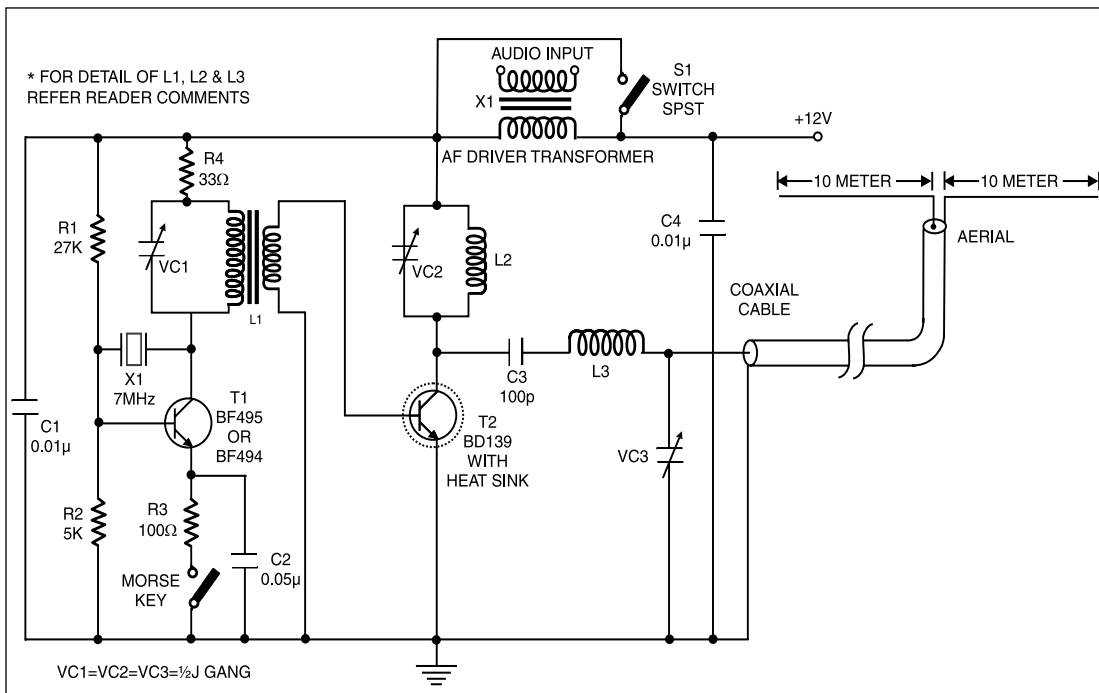
Transistor T2 (with identical tank circuit connected at its collector as in case of transistor T1) serves as a power amplifier. The RF output from oscillator stage is inductively coupled to the power amplifier stage. The output from power amplifier is routed via capacitor C3 and inductor L3 to a half-wave dipole using a 75-ohm coaxial cable. $\frac{1}{2}$ J gang capacitor VC3 along with inductor L3 forms an antenna tuning and matching network between the output of power amplifier stage and coaxial transmis-

sion line for maximum power transfer. Suitable heatsink should be used for transistor T2.

Tuning adjustments may be accomplished using a 6-volt torch bulb. Connect the bulb to the collector of transistor T1 first through a coupling capacitor and tune $\frac{1}{2}$ J gang VC1 for maximum brilliance. (Note: the bulb would light according to intensity of RF energy.) Same procedure may be repeated for power amplifier stage and antenna tuning network for ensuring maximum power transfer.

For CW operation, switch S1 is to be kept on for bypassing the audio driver transformer and Morse key is used for on/off-type modulation. CW would be generated during key depressions. For AF modulation, Morse key points should be closed and switch S1 should be flipped to 'off' position.

Any suitable mic. amplifier may be used to feed audio input to the audio driver transformer X1. (For transformer X1 you may use the transistor-radio type AF driver transformer.)



Reader Comments:

□ I request the author for the following clarifications:

1. Please indicate the construction details of coils L1 and L3 as well as the inductor which is connected in parallel to VC2.

2. Can we use any other crystal in place of 7MHz crystal?

M.A. Kamal
Guwahati

□ What is the range of this transmitter and what is the output power of this circuit?

Vaibhav Kumar
Saharanpur

The author D. Prabakaran, comments:

In reply to the above queries, I would like to say that the transistor T1 is BF495. Power output of this circuit is about 150mW. It can be further increased by using separate power supply for the power-amplifier stage (24V, 1A).

The coil details are as follows— L1 is short-wave oscillator coil; L2:14 turns on 1cm-diameter air-core tube using 26 SWG wire; L3 has 12 turns on 1.5cm-diameter

air-core tube using 26 SWG wire.

The frequency allotted for amateur radio operators is 7.0 MHz to 7.1 MHz. Hence, any crystal available within this frequency can be used. Range of this QRP transmitter depends on propagation conditions. If conditions are good, the range is about 500 kms in the CW mode and 100 kms in the AM mode.

It is possible to convert this transmitter to 20-meter HAM band. Any crystal available from 14 MHz to 14.350 MHz range can be used for the purpose. However, this conversion needs following

modifications on coils L1, L2 and L3—L1: shortwave oscillator coil; L2: 11 turns on 1cm-diameter air-core tube using 26 SWG wire; L3: 9½ turns on 1cm-diameter air-core tube using 28 SWG wire.

An ammeter with a range 0-250mA or a multimeter with 0-250mA can be

connected in-between the positive of the supply and the modulation transformer. Adjust VC1, VC2 and VC3 for maximum current through ammeter (CW-200mA, AM-125mA). The power input in CW and AM mode is calculated as shown below:

DC power input (CW mode) = 24V

x 250mA

= 6watt (the power amplifier draws 250mA current).

DC power input (AM mode) = 24V x 120mA

= 2.8watt (the power amplifier draws 120mA current).